

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE STANDARD**  
**Connecticut/Rhode Island**  
**SILAGE LEACHATE COLLECTION AND TRANSFER**  
**(No.)**  
**Code 765**

**DEFINITION**

A planned and designed facility in which all necessary components are installed for collecting and managing leachates and runoff from bunker or trench silos, conventional tower silos and plastic bag silos.

**PURPOSE**

This standard establishes the minimum locations, setbacks, isolation distances, storage volume requirements, and collection and transfer requirements for silage leachate. The purpose of this standard is not to locate or to design the silo itself

**CONDITIONS WHERE PRACTICE APPLIES**

- The collection, temporary storage, and transfer components are part of a planned agricultural waste management system.
- Temporary storage is needed for leachates generated from silos.
- Leachate is diluted and/or aerated in the temporary storage facility or
- A transfer conveyance is needed from the temporary leachate storage to another waste storage facility (manure, milkroom washwater, barnyard runoff, etc.)
- The collection, temporary storage, and transfer components can be constructed, operated, and maintained without polluting air or water resources.
- Soils, geology, and topography are

suitable for construction of the components.

**CRITERIA**

Location

The silage leachate collection and transfer facility shall be located so as to meet all local, state and federal setback requirements including those stated in environmental protection, planning and zoning, wetlands, health department, milk inspection, and stream channel encroachment regulations.

The silage leachate collection area and temporary storage shall be located adjacent to the silo and shall have the following minimum separation/isolation distances:

- 200 feet from a private well or spring
- 500 feet from a public well
- \* 200 feet from property lines, public roads, and drinking water supply lines.
- 300 feet from an occupied building (other than the landowners)
- Above the 100-year floodplain (or protected from inundation due to the 100-year event)
- Two feet above the seasonal high groundwater table
- Four feet above bedrock

\* For existing silos, this distance may be waived by the state conservation engineer if relocation is impractical.

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## TEMPORARY STORAGE PONDS OR TANKS

All silage leachate storage structures shall be lined unless a detailed risk assessment determines otherwise. The risk assessment shall include an analysis of subsurface travel time of potential leachates and the predicted environmental effect from those leachates. For earthen pond-type storage facilities, lining shall be provided by clay, bentonite or high-density polyethylene geomembranes conforming to NRCS Practice Standard 521A.

Concrete and metal tanks, unless certified watertight and corrosion resistant by the manufacturer, shall have flexible geomembranes installed below and adjacent to them. For those installations, the minimum thickness of the geomembrane shall be 11 mils.

- Concrete corrosion protective barrier coatings including organic resins such as epoxies, polystyrenes, and polyurethanes as well as properly formulated portland-cement based mortar coatings with latex and condensed silica fume additives may be used.
- All fabricated structures shall meet the service life and durability requirements of NRCS Standard 313 waste storage facility.
- Certified watertight and corrosion-resistant tanks such as fiberglass or other plastic/fiber composites, will not require a separate geomembrane.
- All covered tanks shall be adequately vented to preclude the build-up of harmful gases such as hydrogen sulfide.
- Pipelines from enclosed buildings shall be provided with a water sealed trap and vent or similar devices to control gas entry into the buildings.

## DESIGN STORAGE VOLUME

CASE 1 – If leachate is stored for more than two days.

Silage leachate storage structures shall be sized to contain the maximum leachate volume anticipated in the first three weeks after ensiling. In addition, the storage volume shall be doubled to ensure a dilution of at least 1:1 with clean water which is intercepted by the collection system. For the purposes of this case, use 7.48 gallons of leachate produced per ton of silage as recommended in the Ag Waste Management Field Handbook.

The following example is presented for sizing:

**Given:** silo size = 40' wide x 120' long x 12' high = 57,600 cu. feet

**And:** silage tonnage = 57,600 cu. feet x 45 lb/ft<sup>3</sup> ÷ 2,000 lb/ton = 1,296 tons

**Find:** silage leachate = 1296 tons x 7.48 gal/ton = 9,694 gals

**Therefore to Ensure Dilution:**

Use two 10,000 gallon tanks.

CASE 2 – If leachate is stored for less than two days and transferred within that period either by gravity or pumping to another waste storage facility (manure storage, milkroom washwater, barnyard runoff, etc.), or if transferred to field application via irrigation.

For this case, the temporary silage leachate storage structure shall be either pond type or tank type and shall be sized to hold a minimum of two days of silage leachate. However, in no case shall the temporary storage be less than 2,000 gallons. For the purposes of this case use .36 gal/ton/day of leachate produced.

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The following example is presented for sizing:

**Given:** silo size = 40' wide x 120' long x 12' high = 57,600 cu. feet

**And:** silage tonnage = 57,600 cu. feet x 45 lb/ft<sup>3</sup> ÷ 2,000 lb/ton = 1,296 tons

**Find:** 2-day leachate volume: 1296 tons x .36 gal/ton/day x 2 days = 933 gals

Since 933 gals. is less than the minimum required use 2,000 gal minimum volume for storage.

## COLLECTION SYSTEM

Leachate may be collected in various ways. Collection troughs may be precast into the concrete floor of the silo, weep holes may be installed in the silo walls, or a collection trench may be installed at one or both ends of the silo. Collection trenches may be precast concrete with steel grating, or stone-filled with perforated plastic conduit. If open grating is used in the collection system, screens or other devices shall be installed to prevent plugging of any conduit or tank components. If the silo floors are gravel, a subsurface drainage system shall be installed in the silo base to collect the leachate.

Leachate from plastic silage bales shall be collected by placement of a durable traffic resistant catchment trap around and under the location where the bale is placed or by another method which assures that leachate does not pose an environmental hazard.

## TRANSFER PIPE AND IRRIGATION COMPONENTS

Gravity or pressurized transfer pipes are used to convey the silage leachate from the temporary storage pond or tank to a waste storage facility, to a spreader or hauling unit, or to field application by irrigation. All pipes, pumps, and irrigation components shall be

non-corrosive and otherwise conform with NRCS Standards: 533 Pumping Plant for Water Control; 442 Irrigation System, Sprinkler; and 430 Irrigation Water Conveyance. Gravity transfer pipes shall be non-corrosive, 4" minimum diameter, and designed for anticipated loads.

Pumps and their components shall be designed to withstand the corrosiveness of silage leachate and shall be sized to allow for at least the minimum run and rest times of the pump as recommended by the manufacturer.

## SAFETY PROVISIONS

Open structures shall be provided with covers or barriers such as gates, bars, or fencing. Warning signs shall be provided to minimize accidental drowning, explosion, or asphyxiation due to hydrogen sulfide and other poisonous gases. See the operations and maintenance section of this standard for additional safety provisions.

## CONSIDERATIONS

Prior to design of a collection and storage system, analyze the ground and surface water conditions at the silo site. If high groundwater or seepage conditions are present, a subsurface curtain drain installation may be needed. If surface water is a problem, a diversion may be warranted. Consider moving the silo to a more suitable location, if solutions to existing water conditions are impractical.

Cover open silage piles with airtight 6 mil black plastic or equivalent. Coverings need to be weighed down to prevent wind displacement. Plastic silage covers preserve the quality of the silage, minimize dry matter loss, and minimize leachate production from rainfall infiltration. Studies have shown that

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it is more cost-effective to cover open piles than to leave them uncovered.

In order to reduce the volume of leachate, encourage the farmer to harvest the crop at the correct dry matter content. Refer to NNTC Environmental Quality Technical Note No. 5, August 1995, for guidelines.

To further reduce the volume of leachate, consider adding absorbent materials such as alfalfa cubes, chopped dry hay or beet pulp.

## **PLANS AND SPECIFICATIONS**

Plans and specifications for silage leachate collection and transfer shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use. To the extent practical, specifications shall conform to NRCS National Engineering Handbook, Section 20.

## **OPERATIONS AND MAINTENANCE**

- The protective covers or barriers for open structures shall be maintained to provide safety to humans and animals.
- Shields and other safety features shall be installed and maintained on pumps.
- Vent pipes for covered tanks shall be kept clear of obstructions.
- Safety precautions shall be exercised prior to entering confined spaces which may contain asphyxiating gases (i.e., self-contained breathing apparatus, proper ventilation, etc.)
- Silage solids which can cause clogging of elements of the collection, storage and transfer components shall be excluded. Grates, screens, or other anti-clogging devices shall be checked and cleaned as necessary.

- If emptying storage facilities by pumping is involved, a detailed plan shall be formulated for pumping frequency. Manual or automatic controls shall be maintained in good working order. All pumps, controls, and appurtenances shall be corrosive resistant and periodically maintained or replaced as necessary.
- Land application of silage leachates can be environmentally destructive if not properly diluted or pre-treated. Refer to Sections E-3 and E-4 of NNTC Environmental Quality Technical Note No. 5, August 1995, for leachate treatment and land application recommendations.
- Good recordkeeping is essential for proper O&M and evaluation of the installed facility. Records should be kept showing the dates of ensiling, percent of dry matter in the silage, volume and frequency of leachate production and removal, and application rates and effects on vegetative cover.

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